

## CLAIMS

1. A high frequency receiver provided in a same housing as a housing including a transmitter having a transmission signal generation part, having a frequency band of a receive signal in a vicinity of a frequency of a carrier wave of a transmission signal generated by the transmission signal generation part, and to which a high frequency signal including the receive signal and a transmission signal released from a transmitting antenna of the transmitter is input via an antenna,
- the high frequency receiver comprising:
- an input terminal to which the high frequency signal is input;
- a mixer having a first input terminal to which the high frequency signal input to the input terminal is input and a second input terminal to which an output signal from a local oscillator is input; and
- an output terminal to which an output signal from the mixer is input, wherein the high frequency receiver comprises
- a distributed transmission signal input terminal to which at least a part of a distributed transmission signal obtained by distributing the transmission signal is input in the housing;
- a phase shifter to which the distributed transmission signal input to the distributed transmission signal input terminal is input;
- a detector for detecting a level of the transmission signal included in the distributed receive signal obtained by distributing the high frequency signal; and
- a level regulator having a first input terminal to which an output from the detector is coupled and a second input terminal to which the distributed transmission signal is input, and

the level regulator changes a level of the distributed transmission signal in accordance with an output signal from the detector, and a signal input via the level regulator and the phase shifter and the high frequency signal are synthesized to be input to the mixer.

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2. The high frequency receiver of claim 1,

wherein the high frequency receiver has a transmission level signal input terminal to which a transmission level wave-detection signal obtained by detecting an output level of a power amplifier of the transmitter is input, and  
10 the transmission level wave detection signal and an output signal from the detector are input to the level regulator in which the level of the distributed transmission signal is changed in accordance with these signals.

3. The high frequency receiver of claim 1, comprising:

15 a phase changer provided in the phase shifter and changing a phase of the distributed transmission signal in accordance with a control signal to be input;

a phase controller for generating a control signal to control a phase change amount of the phase changer; and

20 a memory coupled to the phase controller,

wherein the memory includes a table storing the control signal to be input to the phase changer in accordance with a channel to be received, and the phase controller generates a control signal in accordance with the receiving channel based on the table and inputs it to the phase changer.

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4. The high frequency receiver of claim 3,

wherein the phase changer includes a variable-capacitance diode, and the

control signal is a voltage to be input for changing the capacitance of the variable capacitance diode.

5. The high frequency receiver of claim 1,

5 wherein the phase shifter includes:

a phase changer for changing a phase of the distributed transmission signal in accordance with the control signal to be input; and

a phase control terminal to which a control signal from the phase controller coupled to the phase changer is coupled,

10 to the phase control terminal, a control signal for controlling a phase change amount of the phase changer into a phase change amount corresponding to each receiving channel is input, and the phase changer changes a phase of the distributed transmission signal based on the control signal.

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6. The high frequency receiver of claim 1,

wherein the phase shifter include:

a phase changer for changing a phase of the distributed transmission signal in accordance with the control signal to be input;

20 a phase control terminal to which a control signal from a phase controller coupled in order to control a phase change amount of the phase changer;

a phase comparator having a first input terminal to which the distributed transmission signal is input and a second input terminal to which  
25 the distributed receive signal is input; and

a low-pass filter to which an output terminal of the phase comparator is coupled, and

the phase comparator detects a phase difference between the distributed transmission signal and the distributed receive signal, and the phase changer changes the phase change amount in accordance with the phase difference.

5        7. The high frequency receiver of claim 1,

wherein the distributed transmission signal is a signal obtained by distributing the transmission signal before it undergoes amplification in a power amplifier of the transmitter.

10       8. The high frequency receiver of claim 7, comprising

a first band-pass filter coupled between the distributed transmission signal input terminal and the level regulator,

wherein the first band-pass filter allows a frequency of a transmission signal noise among transmission signals to pass and attenuates a frequency of a carrier wave.

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9. The high frequency receiver of claim 8, comprising

a synthesizer coupled between the input terminal and the mixer, and having the first input terminal to which a high frequency signal is input and the second input terminal to which a signal is input via the level regulator and the phase shifter.

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10. The high frequency receiver of claim 9,

wherein a second band-pass filter is provided between the input terminal and the first input terminal of the synthesizer, a high-frequency amplifier is coupled between an output from the synthesizer and an input to the mixer, and the second band-pass filter allows a signal having a receive

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frequency to pass and attenuates the transmission signal.

11. The high frequency receiver of claim 10,

wherein both the first band-pass filter and the second band-pass filter  
5 allow the frequency of the transmission signal noise to pass and attenuate a  
frequency of the transmission signal.

12. The high frequency receiver of claim 11,

wherein the first band-pass filter and the second band-pass filter have  
10 same attenuation properties.

13. The high frequency receiver of claim 10, comprising

a third band-pass filter provided in parallel to the second band-pass  
filter; and

15 a switch coupled to the third band-pass filter and the second band-pass  
filter, and allowing any one of the second and third band-pass filters to  
selectively be coupled between the input terminal and the mixer,

wherein a narrow band filter is used for the second band-pass filter and  
a passband of the third band-pass filter is set to be lower than a passband of the  
20 second band-pass filter.

14. The high frequency receiver of claim 1,

wherein the distributed transmission signal is a signal obtained by  
distributing a signal amplified by a power amplifier of the transmitter.

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15. The high frequency receiver of claim 14, comprising

a synthesizer coupled between the input terminal and the mixer and

having the first input terminal to which a high frequency signal is input and the second input terminal to which a signal is input via the level regulator and the phase shifter.

- 5        16. The high frequency receiver of claim 9, comprising  
         a fourth band-pass filter provided between an output from the  
synthesizer and the mixer and to which an output from the mixer is coupled;  
and  
         a high-frequency amplifier coupled between the fourth band-pass filter  
10 and the mixer,  
         wherein the fourth band-pass filter allows a receive frequency signal to  
pass and attenuates a transmission signal.

17. The high frequency receiver of claim 16, comprising  
15        a fifth band-pass filter provided in parallel to at least the fourth band-  
pass filter; and  
         a switch coupled to the fifth band-pass filter and the fourth band-pass  
filter and allowing any one of the output signals from the fourth and fifth band-  
pass filters to selectively be input to the mixer,  
20        wherein a narrow band filter is used for the fourth band-pass filter and  
a passband of the fifth band-pass filter is set to be lower than a passband of the  
fourth band-pass filter.

18. A transmitter provided in a same housing as a housing including the  
25 high frequency receiver of claim 1 and transmitting a signal having a frequency  
in a vicinity of a frequency of a receive signal of the high frequency receiver  
from a transmitting antenna,

the transmitter comprising:

an input terminal;

a transmission signal generation part to which a digital signal input to the input terminal is input and which generates a transmission signal; and

5 a transmission signal output terminal to which an output from the transmission signal generation part is input and which inputs the transmission signal to the transmitting antenna;

wherein between an output from the transmission signal generation part and the transmission signal output terminal, a first distributor having an  
10 input coupled to an output from the transmitted signal generation part and one output signals coupled so as to be input to the transmission signal output terminal, and a distributed transmission signal output terminal coupled to another output from the first distributor are provided.

15 19. The transmitter of claim 18,

wherein the transmission signal generation part includes a local oscillator for generating an oscillation noise at least in a frequency band of a receive signal, and a power amplifier is coupled between the first distributor and the transmission signal output terminal.

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20. The transmitter of claim 18,

wherein between the distributed transmission signal output terminal and the another output from the first distributor, a first band-pass filter is coupled, and the first band-pass filter allows a frequency of an oscillation noise  
25 of a local oscillator to pass and attenuates a signal having a frequency of a carrier wave.

21. The transmitter of claim 18,

wherein the transmission signal generation part comprises an oscillator,  
and a power amplifier to which an output from the oscillator is coupled, the  
power amplifier using a power amplifier that generates a noise in a frequency  
5 band of a receive signal, and a transmission signal output from the power  
amplifier is distributed by the first distributor and output.

22. The transmitter of claim 21, comprising

a second distributor to which the another output from the first  
10 distributor is coupled and which has a first output terminal coupled to the  
transmission signal output terminal; and

a coupling transmission level detector coupled between a second output  
terminal of the second distributor and an electric control terminal of the power  
amplifier.

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23. A transmitter provided in a same housing as a housing including the  
high frequency receiver of claim 5 or 14 and transmitting a signal having a  
frequency in a vicinity of a receiving frequency of the high frequency receiver  
from a transmitting antenna,

20 the transmitter comprising:

an input terminal;

a transmission signal generation part to which a digital signal input to  
the input terminal is input and which generates a transmission signal, and

a transmission signal output terminal to which an output from the  
25 transmission signal generation part is input and which inputs the transmission  
signal to the transmitting antenna,

wherein the transmitter includes:



a power amplifier to which an output from the transmission signal generation part is coupled and which generates a noise into a frequency in a frequency band of a receive signal;

a first distributor to which an output from the power amplifier is  
 5 input and which has a first output terminal coupled to the transmission signal output terminal; and

a distributed transmission signal output terminal coupled to a second output terminal of the first distributor, and

the first distributor distributes a transmission signal amplified by the  
 10 power amplifier.

24. Portable equipment comprising the transmitter and a high frequency receiver for receiving a high frequency signal having a frequency in a vicinity of a carrier wave of a transmission signal of the transmitter in a same housing,

15 the portable equipment comprising:

an antenna;

a high frequency receiver to which the high frequency signal input to the antenna is input;

a demodulator circuit to which an output from the high frequency  
 20 receiver is coupled;

a decoder circuit to which an output from the demodulator circuit is coupled;

a voice output device and a display device to which an output from the decoder circuit is coupled;

25 a voice output device;

an encoder circuit coupled between an output from the voice input device and an input of the transmitter; and

a transmitting antenna to which an output from the transmitter is input,

wherein the high frequency receiver uses the high frequency receiver of claim 1, the transmitter uses the transmitter of claim 18, and the distributed transmission signal output terminal and the distributed transmission signal input terminal are coupled to each other in the housing.

25. Portable equipment comprising the transmitter and a high frequency receiver for receiving a high frequency signal having a frequency in a vicinity of a carrier wave of a transmission signal of the transmitter in a same housing,

the portable equipment comprising:

an antenna;

a high frequency receiver to which the high frequency signal input to the antenna is input;

a demodulator circuit to which an output from the high frequency receiver is coupled;

a decoder circuit to which an output from the demodulator circuit is coupled;

a voice output device and a display device to which an output terminal of the decoder circuit is coupled;

a voice output device;

an encoder circuit coupled between an output terminal of the voice input device and an input terminal of the transmitter; and

a transmitting antenna to which an output signal from the transmitter is input,

wherein the high frequency receiver uses the high frequency receiver of claim 5, the transmitter uses the transmitter of claim 23, and the distributed

transmission signal output terminal and the distributed transmission signal input terminal are coupled to each other in the housing.

26. Portable equipment comprising the transmitter and a high frequency receiver for receiving a high frequency signal having a frequency in a vicinity of a carrier wave of a transmission signal of the transmitter in a same housing, the portable equipment comprising:
- an antenna;
  - a high frequency receiver to which the high frequency signal input to the antenna is input;
  - a demodulator circuit to which an output from the high frequency receiver is coupled;
  - a decoder circuit to which an output from the demodulator circuit is coupled;
  - a voice output device and a display device to which an output from the decoder circuit is coupled;
  - a voice output device;
  - an encoder circuit coupled between an output from the voice input device and an input of the transmitter; and
  - a transmitting antenna to which an output from the transmitter is input,
- wherein the high frequency receiver uses the high frequency receiver of claim 14, the transmitter uses the transmitter of claim 23, and the distributed transmission signal output terminal and the distributed transmission signal input terminal are coupled to each other in the housing.

27. A method of manufacturing the high frequency receiver of claim 3, the

method comprising:

inputting a pseudo distributed transmission signal of a first signal level to a distributed transmission signal input terminal and inputting a pseudo transmission signal having a signal level that is different from the first signal level by a predetermined value and in which a phase is delayed by a value predetermined by the pseudo distributed transmission signal and a receive signal to be received by a high frequency receiver; and then

receiving a receiving channel predetermined by the high frequency receiver;

the method further comprising, after the receiving, changing a control signal to be input to a phase changing part in a state in which the high frequency receiver receives the receiving channel and allowing a memory to store a signal that is output when a quality of a signal output from the output terminal is most excellent.

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28. A method of manufacturing portable equipment in which the transmitter of claim 18 and the high frequency receiver of claim 3 are provided in a same housing, the method comprising:

releasing a transmission signal generated by the transmitter from a transmitting antenna, inputting a high frequency signal including the transmission signal to an input terminal, and distributing a transmission signal in the housing and inputting it to a distributed transmission signal input terminal; and then

receiving a receiving channel predetermined by the high frequency receiver;

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the method further comprising, after the receiving:

changing a voltage to be input to a phase changing part in a state in

which the receiving channel is received and allowing a memory to store a voltage that is output when a quality of a signal output from the output terminal is most excellent.

5        29. An integrated circuit, comprising:

          an input terminal to which a high frequency signal is input;

          a mixer having a first input terminal to which the high frequency signal input to the input terminal is coupled and a second input terminal to which an output signal from a local oscillator is input;

10        an output terminal to which an output signal from the mixer is input;

          and

          a PLL circuit loop-coupled to the local oscillator,

          wherein the integrated circuit for the high frequency receiver comprises:

15        a distributed transmission signal input terminal,

          a phase shifter to which a distributed transmission signal input to the distributed transmission signal is input,

          a detector for detecting a level of the transmission signal included in a distributed receive signal obtained by distributing the high frequency signal,

20        and

          a level regulator having a first input terminal to which an output terminal of the detector is coupled and a second input terminal to which the distributed transmission signal is input, and the level regulator changes the level of the distributed transmission signal in accordance with the output from  
25        the detector and outputs a signal to be input via the level regulator and the phase shifter.

30. The integrated circuit of claim 29,

wherein the phase shifter comprises a phase changer for changing the phase of a distributed transmission signal in accordance with a control signal to be input, and the control signal is input via the PLL circuit.